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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/020,040

10/18/2001

Robert J. Crowley

267/017

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06/14/2004

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EXAMINER

CONNOLLY, PATRICK J

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 06/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                |                                |            |
|------------------------------|--------------------------------|--------------------------------|------------|
| <b>Office Action Summary</b> | Application No.<br>10/020,040  | Applicant(s)<br>CROWLEY ET AL. |            |
|                              | Examiner<br>Patrick J Connolly | Art Unit<br>2877               | <i>PCW</i> |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2004.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,4-6,8-20,22-25 and 27-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28-37 is/are allowed.
- 6) ☒ Claim(s) 1,4-6,8-15 and 27 is/are rejected.
- 7) ☒ Claim(s) 16-20 and 22-25 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments filed April 22, 2004 have been fully considered but they are not persuasive.

As to the applicant's arguments regarding claims 1, 4-6, 8-15 and 27, the multiple detectors in parallel of Swanson are configured to detect samples in motion, but do so through the detection of the light intensity of an interference pattern.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4-6 and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,843,145 to Tenhoff, and further in view of U.S. Patent No. 5,321,501 to Swanson et al. (Swanson).

As to claims 1, Tenhoff teaches an imaging system including (see Figures 7, 8):  
an ultrasound console(104);  
an interferometer (Figure 8, also Swanson et al);  
wherein the ultrasound console processes data provided by the interferometer to form an image for display (104).

With further regard to claim 1, Tenhoff teaches, by way of incorporation of reference of U.S. Patent No. 5,321,501 to Swanson et al, a method and apparatus for analyzing a surface

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including (see Swanson figure 9, 1B, also column 15, lines 34-65): forming a sample and reference light beam by way of an interferometer; combining light received from the surface with reference light beam; detecting combined light with a multi element detector to output a plurality of parallel signals; converting processed parallel signals to serial signal; and providing the serial signal to the ultrasound processor for imaging.

Swanson teaches a multi element photodetector (52A, 52B, 52C).

Swanson teaches a parallel to serial converter (see Figure 9, 55A, 55B, 55C).

It would have been obvious to one of ordinary skill in the art at the time of invention to include the interferometer and processing setup of Swanson et al in the ultrasound and interferometer set up of Tenhoff in order to process images more complexly.

As to claim 4, Tenhoff teaches multiple inputs coupled to the ultrasound console (see column 4, lines 30-35).

As to claim 5 and 6, Tenhoff teaches a catheter (see Figure 9).

As to claim 8, Swanson teaches the use and processing of analog serial data through the use of electronic circuitry (see column 15, lines 34-65).

As to claim 9, while Swanson does not teach the use and processing of digital serial data specifically, it is notoriously well known in the art to use both digital and analog data for processing. It would have been obvious to one of ordinary skill in the art at the time of invention to configure the apparatus of Tenhoff by way of Swanson et al. to process either analog or digital data, as they are functionally equivalent.

As to claim 10, while Swanson does not teach two multi-element detectors, he does teach several single element detectors connected in parallel for parallel to serial processing (see Figure 9).

It would have been obvious to one of ordinary skill in the art at the time of invention to replace the multiple single element detectors with several multi-element detectors so that the apparatus could be more compact.

As to claim 11, Tenhoff teaches an interferometer comprising (see Figure 8):  
means for creating a sample light beam and a reference light beam from a light source (208-210, 225-233);

means for conveying the sample light beam to a sample (207, 208);

means for introducing a time delay (226);

means for combining said beams for detection (208, 211);

As to claim 12, Tenhoff teaches a beam splitter (208).

Claims 13-15 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,830,145 to Tenhoff in view of U.S. Patent No. 5,321,501 to Swanson et al. (Swanson) as applied to claims 1, 4-6 and 8-12 above, and further in view of U.S. Patent No. 5,943,133 to Zeylikovich et al.

As to claims 13-15 and 27, Zeylikovich teaches a method and apparatus for performing optical coherence tomography including using a diffraction grating to introduce a time delay and combining beams (see for example figure 11). Zeylikovich also teaches using multiple beam splitters to combine light, as is notoriously well known in the art.

It would have been obvious to one of ordinary skill in the art at the time of invention to include a diffraction grating and multiple beam splitters in the ultrasound console with interferometer combination of Tenhoff, as these interferometers are used for similar measurements, and are well known to be used in combination with ultrasound measuring techniques.

As to claim 27, Zeylikovich teaches a focusing lens. It would have been obvious to one of ordinary skill in the art at the time of invention to include this lens in the apparatus of Tenhoff as it is notoriously well known in the art to use focusing lenses to improve measurement quality.

***Allowable Subject Matter***

Claims 28-37 are allowed.

The following is an examiner's statement of reasons for allowance:

As to claim 28, the prior art of record, taken alone or in combination, fails to disclose or render obvious an imaging system including an interferometer that includes: a second beamsplitter positioned to receive a diffracted reference light beam; and wherein the reference light beam and a reflected sample light beam are combined in a second beamsplitter to form a combined light beam, in combination with the rest of the limitations of claim 28.

As to claim 32, the prior art of record, taken alone or in combination, fails to disclose or render obvious an imaging system including an interferometer that includes: a second beamsplitter positioned to receive a diffracted reference light beam; and wherein the reference light beam and a reflected sample light beam are combined in a second beamsplitter to form a combined light beam, in combination with the rest of the limitations of claim 32.

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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Claims 16-20 and 22-25 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:


As to claim 16, the prior art of record, taken alone or in combination, fails to disclose or render obvious an imaging system including an interferometer that includes: a diffraction grating in communication with a first beamsplitter to received a reference light from beamsplitter and diffract a reference light beam; and a second beamsplitter positioned to receive a diffracted reference light beam; and wherein the reference light beam and a reflected sample light beam are combined in a second beamsplitter to form a combined light beam, in combination with the rest of the limitations of claim 16.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick J Connolly whose telephone number is 571.272.2412. The examiner can normally be reached on 9:00 am - 7:00 pm Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571.272.2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

pjc PJC  
06.07.2004



Samuel A. Turner  
Primary Examiner